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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/963,485 | 09/27/2001 | Norihiko Sekine | 011292 | 9317 |

23850 7590 03/13/2003

ARMSTRONG, WESTERMAN & HATTORI, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER

KANG, DONGHEE

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2811

DATE MAILED: 03/13/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/963,485

Applicant(s)

SEKINE, NORIHIKO

Examiner

Donghee Kang

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 7-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) filed September 27, 2001.

Election/Restrictions

3. Claims 7-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Claim Objections

4. Claims **3-5** are objected to because of the following informalities:

Referring to claim 3, line 7: the phrase "one or more layer" should be - -one or more layers--.

Referring to claims 4-5: the phrase "a compound semiconductor layer" in lines 1-2, respectively, should be - -said compound semiconductor layer--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims **1-2 & 6** are rejected under 35 U.S.C. 102(b) as being anticipated by Itaya et al. (US 5,780,873).

Regarding claim **1**, Itaya et al. teach a semiconductor device comprising (Fig.6):
a first semiconductor substrate (GaN-based light-emitting device structure section, 117-111); a second semiconductor substrate (GaAs, 118) different in lattice constant from said first semiconductor substrate (Col.12, lines 9-10), said second semiconductor substrate being bonded to said first semiconductor substrate; and an amorphous layer (119) made of constituent atoms of said first and second semiconductor substrates (Col.12, lines 7-9) and formed at an interface between said first and second semiconductor substrates. *See also Col.10, lines 43-Col.12, line 29.*

Regarding claim **2**, Itaya et al. teach said first semiconductor substrate including a light-emitting layer (113; Col.10, lines 50-51).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims **3-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Itaya et al. (US 5,780,873) in view of Piprek et al. ("Abrupt self-switching in fused GaAs/InP vertical-cavity lasers", CELO'99, pp. 458).

Regarding claim 3, Itaya et al. teach that the second semiconductor substrate is a GaAs substrate but do not teach the first semiconductor substrate being an InP substrate.

Long-wavelength lasers are very attractive owing to their application in optical communication systems and InP-based semiconductor material is conventionally used as an active layer in vertical-cavity surface emitting lasers to obtain long emission wavelength. Piprek et al. teach forming vertical-cavity lasers with long emission wavelength using InP-based light emitting structure on GaAs substrate (See Fig.2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute GaN-based light emitting structure in Itaya's device with InP-based light emitting structure as taught by Piprek to make a long wavelength laser, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 4, Itaya et al. do not teach the first semiconductor substrate including a compound semiconductor layer made of InGaAsP. InGaAsP is conventionally used as an active layer in InP based light emitting structure and also Piprek et al. teach InGaAsP MQW between InP cladding layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the active layer using InGaAsP MQW in InP-based light emitting structure, since it has been held to be within the general skill of a worker in the art to select a known

Art Unit: 2811

material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim **5**, Itaya et al. do not teach said second semiconductor substrate including a compound semiconductor layer, which is made of $\text{Al}_x\text{Ga}_{1-x}\text{As}$ (x is a number from zero to one). Piorek et al. teach the second semiconductor substrate (GaAs) including GaAs/AlAs DBR to obtain resonant cavity structure. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form GaAs/AlAs DBR in Itaya's device, since the GaAs/AlAs DBR can decrease an optical loss, hence increasing light intensity.

9. Claim **6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Itaya et al. (US 5,780,873).

Itaya et al. do not expressly teach the amorphous layer having a thickness of 1 nm or more. However, Itaya et al. teach the amorphous layer having a thickness of about 10 nm, which is in the range claimed by the applicant (Col.10, lines 58-59). It is an obvious matter of routine experimentation to find the optimal thickness range. Generally, differences in thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such thickness is critical. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the amorphous layer having a thickness of 1 nm or more, since it has been held that where the general conditions of a claim are disclosed

Art Unit: 2811

in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Donghee Kang

Donghee Kang
Patent Examiner

dhk
March 9, 2003